IN THE CLAIMS:

Claims 1-15 (Canceled)

Claim 16 (Previously Presented) A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface, an orifice, and a first channel surface, the orifice having a first diameter;

a metering orifice disc located at the outlet, the metering orifice disc having a plurality of metering openings extending therethrough, a second channel surface confronting the first channel surface, the metering openings tangential to a virtual circle, the virtual circle having a diameter greater than the first diameter;

a needle being reciprocally located within the housing along the longitudinal axis between a first position wherein the needle is displaced from the valve seat, allowing fuel flow past the needle, and a second position wherein the needle is biased against the valve seat, precluding fuel flow past the needle; and

a controlled velocity channel disposed between the first channel surface of the valve seat and the second channel surface of the metering orifice disc, the controlled velocity channel extending outwardly from the orifice to the plurality of metering openings, such that fuel flow is at a generally constant velocity between the orifice and the plurality of metering openings.

Claim 17 (Previously Presented) A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface and an orifice;

a metering orifice disc located at the outlet, the metering orifice disc having a plurality of metering openings extending therethrough;

a closure member being reciprocally located within the housing along the longitudinal axis between a first position wherein the closure member is displaced from the valve seat, allowing fuel flow past the closure member, and a second position wherein the closure member is biased against the valve seat, precluding fuel flow past the closure member; and

a flow channel formed between the orifice and the metering orifice disc, the channel extending between a first end and a second end, the first end disposed at a first radius from the longitudinal axis and spaced at a first distance from the metering orifice disc, the second end disposed at a second radius proximate the plurality of metering openings with respect to the longitudinal axis and spaced at a second distance from the metering orifice disc such that a product of the first radius and the first distance is equal to a product of the second radius and the second distance so as to maintain a generally constant velocity flow of fuel between the orifice and the metering orifice disc.

Claim 18 (Previously Presented) A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface and an orifice;

a metering orifice disc proximate the outlet, the metering orifice disc having a plurality of metering openings extending therethrough, the metering openings defining a first virtual circle greater than a second virtual circle defined by a projection of the sealing surface onto the metering orifice disc so that all of the metering openings are disposed outside the second virtual circle;

a closure member being reciprocally located within the housing along the longitudinal axis between a first position wherein the closure member is displaced from the valve seat, allowing fuel flow past the closure member, and a second position wherein the closure member is biased against the valve seat, precluding fuel flow past the closure member; and

a flow channel formed between the orifice and the metering orifice disc, the channel extending between a first end and second end, the first end disposed at a first radius from the longitudinal axis and spaced at a first distance from the metering orifice disc, the second end disposed at a second radius proximate the plurality of metering openings with respect to the longitudinal axis and spaced at a second distance from the metering orifice disc such that a product of the first radius and the first distance is equal to a product of the second radius and the second distance so as to maintain a generally constant velocity flow of fuel between the orifice and the metering orifice disc.

Claim 19 (Previously Presented) A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface, an orifice, and a first channel surface;

a metering orifice disc proximate the outlet, the metering orifice including a second channel surface confronting the first channel surface, the metering orifice disc having a plurality of metering openings extending therethrough, the metering openings defining a first virtual circle greater than a second virtual circle defined by a projection of the sealing surface onto a metering orifice disc so that all of the metering openings are disposed outside the second virtual circle;

one of the first and second channel surfaces forming a tapered channel portion, the metering orifice disc having a plurality of metering openings extending therethrough, the metering openings defining a second virtual circle greater than the first virtual circle so that all of metering openings are disposed outside the first virtual circle;

a closure member being reciprocally located within the housing along the longitudinal axis between a first position wherein the closure member is displaced from the valve seat, allowing fuel flow past the closure member, and a second position wherein the closure member is biased against the valve seat, precluding fuel flow past the closure member; and

a flow channel formed by the first and second channel surfaces, the at least one channel extending in a radial direction from the longitudinal axis and having a changing cross-sectional area as the at least one channel extends outwardly from the orifice to the plurality of metering openings so that a flow path extending radially from the orifice of the seat in any one radial direction away from the longitudinal axis towards the metering orifice disc passes to one metering opening.

Claim 20 (Previously Presented) A method of generating turbulence in a fuel flow through a fuel injector, the fuel injector having a first end and a second end extending along a longitudinal axis, the method including:

providing a fuel flow under pressure to the fuel injector;

opening a valve in the fuel injector and allowing the pressurized fuel to flow past the valve and into an orifice;

directing the fuel flow at an initial velocity from the orifice into a controlled velocity channel formed by a valve seat and a metering orifice disc, the fuel generally maintaining constant velocity through the controlled velocity channel, the controlled velocity generating turbulence within the fuel flow; and

directing the fuel flow through at least one orifice opening downstream of the controlled velocity channel and out of the fuel injector.

Claim 21 (Previously Presented) The method according to claim 20, wherein the controlled velocity channel tapers from a first height at an upstream end of the controlled velocity channel to a second height at a downstream end of the controlled velocity channel, the second height being smaller than the first height.

Claim 22 (Previously Presented) The method according to claim 21, wherein the first height is located at a first radius with respect to the longitudinal axis, the second height is located at a second radius with respect to the longitudinal axis such that a product of the first height and the first radius is substantially equal to a product of the second height and second radius.

Claim 23 (New) A method of controlling a spray of fuel flow through at least one metering orifice of a fuel injector, the fuel injector having an inlet and an outlet and a passage extending along a longitudinal axis therethrough, the outlet having a seat and a metering disc, the seat having a seat orifice and a first channel surface extending obliquely to the longitudinal axis, the metering disc including a second channel surface confronting the first channel surface so as to provide a flow channel, the metering disc having a plurality of metering orifices extending therethrough along the longitudinal axis and located about the longitudinal axis, the method comprising:

locating all of the metering orifices on a first virtual circle outside of a second virtual circle formed by a virtual extension of a sealing surface of the seat on the metering disc such that each of the metering orifices extends generally parallel to the longitudinal axis through the metering disc; and

imparting a radial velocity to the fuel flowing from the seat orifice through the flow channel so that fuel flows in transverse direction across and through the fuel metering orifices.

24. (New) The method of claim 23, wherein the locating of the metering orifices includes spacing a first metering orifice at a first arcuate distance relative to a second metering orifice on the first virtual circle.

25. (New) The method of claim 24, wherein the imparting of a radial velocity to the fuel flow includes configuring the frustoconical flow channel to extend between a first position and a second position, the first position being located at a first distance from the longitudinal axis and at a first spacing along the longitudinal axis relative to the second surface of the metering disc and the second position being located at a second distance from the longitudinal axis and a second spacing along the longitudinal axis from the second surface of the metering disc, such that a product of the first distance and first spacing is generally equal to the a product of the second distance and second spacing.

26. (New) The method of claim 23, wherein the imparting comprises increasing the radial velocity between the seat orifice and each of the metering orifices.

27. (New) The method of claim 23, wherein the imparting comprises decreasing the radial velocity between the seat orifice and each of the metering orifices.